

Directed Research (DR) Proposal			
<b>Number</b>	20060049DR	<b>Category</b>	Physics (P)
<b>Title</b>	Heavy Quarks as a Probe of a New State of Matter		

Principal Investigator			
<b>Name</b>	Patrick Mcgaughey	<b>Z Number</b>	095207
<b>Group</b>	P-25	<b>Mail Stop</b>	H846
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Budget			FY2006		FY2007		FY2008	
Name	Z Number	Group/Org	% Time	Amount	% Time	Amount	% Time	Amount
Patrick Mcgaughey	095207	P-25	50	131,924.33	50	138,520.55	50	145,446.58
Emil Mottola	094572	T-8	50	130,780.83	50	137,319.87	50	144,185.86
David Lee	078815	P-25	50	142,396.23	50	149,516.04	50	156,991.84
Rajan Gupta	099533	T-8	50	138,472.15	50	145,395.76	50	152,665.55
Melynda Brooks	096921	P-25	50	131,924.33	50	138,520.55	50	145,446.58
Gerd Kunde	146421	P-25	50	121,452.43	50	127,525.06	50	133,901.31
Ivan Vitev	194688	P-25	0	.00	0	.00	50	65,281.42
Post Doc	P18K25		100	90,061.22	60	56,738.57	50	49,646.25
Post Doc	P18E08		80	72,048.98	50	47,282.14	70	69,504.75
<b>Materials &amp; Supplies</b>				290,000.00		310,000.00		185,000.00
<b>Totals</b>				1,249,060.51		1,250,818.54		1,248,070.14

## **Proposal Abstract**

Intriguing evidence that a new state of matter, the quark-gluon plasma (QGP), is formed in collisions of ultra-relativistic heavy ions has been presented during the past year by physicists working at the Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory. We propose to develop a unique experimental capability at RHIC for the direct identification of heavy quarks, which will be used to accurately determine the properties of this new state of matter. We will construct a silicon micro-vertex detector (SVD) covering the forward collision region, which will provide the world's best measurement of heavy quarks in the high multiplicity environment of nuclear collisions. We will develop new capabilities in theory and simulation to interpret the more accurate data provided by the SVD, with the goal of establishing the nature of this strongly interacting non-equilibrium plasma.